

REMARKS

The Office Action dated March 27, 2003, has been carefully considered. Claims 1, 6, 8, 10 and 11 have been amended. The specification has been amended to correspond to the amended claims. Claims 4, 5 and 12 have been cancelled. Claims 1, 6-11 and 13-19 are in this application.

The previously presented claims 1, 4, 8, 9, 18 and 19 were rejected under 35 U.S.C. § 103 as obvious in view of previously cited JP 61-216044 to Hara in view of JP 61-48615 to Ochi. Applicants submit that the teachings of these references do not disclose or suggest the invention defined by the present claims.

Applicants note that the adsorbent of the present invention is obtained by adding an aqueous solution having uniformly mixed therein an active carbon and a gel-formable substance. The mixture is changed into a gel. For example, the mixture can be added together with a cross-linking agent, heat-treating the resultant mixture and thereby converted into a gel. The gel is subsequently subjected to a freezing treatment. When the adsorbent of this invention is formed by coating the active carbon with a gel and then subjecting the resultant gel to a freezing treatment, the adsorbent is enabled to keep intact the ability to effect adsorption possessed inherently by the active carbon. Because the moisture in the gel forming the coat is coagulated and is consequently allowed to form in the coat, minute pores are formed which have a larger diameter than the pores which would be formed solely by cross-linkage (see page 6, lines 12-21 of the present specification), and as the freeze-concentration of the cross-linked structure body is generated by freezing treatment, the pore wall becomes strong, it does not swell in the aqueous solution, and the size of the pore is maintained.

Hara describes a hydrophobic konjak gel and a method for production of a formed hydrophobic gel substance, which can be used for various purposes. For the Examiner's reference, Applicants submit a full English translation of Hara as listed in the enclosed Form PTO-1449.

Ochi teaches a corpulence preventing agent formed by providing activated carbon on the surface thereof with a protecting film.

In contrast to the present invention, the hydrophobic konjak gel that Hara teaches is

obtained by preparing a konjak derivative (konjakpaste) by a freezing or heating treatment, mixing the konjak derivative with food fibers (Hara designates this as "catalyst"), and subjecting the resultant mixture to a freezing or heating treatment.

The aforementioned konjak gel of Hara is produced by the following steps.

(a) An aqueous solution of konjak powder and an alkaline substance designated as a catalyst are added together and then heated to produce a konjak derivative (*see* page 5, line 22 through page 7, line 3 of the English translation of Hara JP-A-63-71158).

From the descriptions of examples (1) through (38) etc., it is described that the konjak produced derivative assumes a pasty state and possesses such a nature as to avoid forming a gel even when subjected to a freezing or heating treatment. Specifically, while the ordinary konjak gel is produced by adding an aqueous solution of konjak and an alkaline substance as a cross-linking agent together and heat-treating them to cross-link and gel the konjak and convert it into a gel, the konjak derivative of the step (a) is obtained, even when heated, is in a pasty state and not in the form of a gel because it is produced under such "unsatisfactory conditions" (page 5, lines 13-14, *ibid*) as allow the alkaline substance to be incorporated only in an unduly small amount. Further, the konjak derivative, even when frozen and thawed, continues to remain in the original pasty state and does not form a gel.

(b) Then, the konjak derivative obtained at the step (a) and food fibers (catalyst) are added optionally together in conjunction with "other substances" (*see* page 7, line 4 through page 12, line 4, *ibid*).

(c) Subsequently, the konjak having the food fibers incorporated therein at the step (b) is subjected to a freezing or heating treatment to obtain the water-insoluble gel aimed at.

✱ Thus, the konjak gel of Hara is obtained by adding an aqueous solution of konjak and an insufficient amount, namely, a smaller amount than usual, of a cross-linking agent (such an amount as prevents this agent from being converted into a water-insoluble get even when heated) together to impart a pasty state to the konjak, then adding food fibers and other substances together to the pasty konjak, and subjecting them to a freezing or heating treatment to change to gel the konjak paste owing to the effect of addition of the food fibers. Hara does not teach or suggest an adsorbent formed by the steps of changing a mixture of an aqueous solution of active

carbon and a gel-formable substance into a gel. Rather, the konjak gel of Hara requires simultaneous addition of food fibers and other substances to the pasty konjak derivative to assume the form of gel. Further, if Ochi were to be combined with Hara, the teaching of Hara would suggest that the act of adding activated carbon would occur in conjunction with adding food fibers. The konjak gel that Hara teaches is completely different in structure of gel from the adsorbent of this invention.

Furthermore, the hydrophobic gel of Hara is incapable of manifesting a high ability to effect adsorption because the activated carbon is not easily dispersed uniformly and it exhibits inferior dispersability in the produced gel. In contrast, since the adsorbent of this invention is obtained by mixing an active carbon and a gel-formable substance in an aqueous solution and dispersing them uniformly and subsequently gelating it, the adsorbent assumes the constitution of a dispersion system having the active carbon uniformly dispersed in the water-insoluble gel. The adsorbent of the present invention, therefore, permits highly efficient removal by adsorption of a harmful substance because the adsorbent in its entirety enjoys an increase in the surface area available for adsorption and a consequent increase in the ability to effect adsorption as compared with the adsorbent produced by solely using active carbon in a highly dispersed state (see page 7, lines 4-14 of the present application).

Claims 5-7 and 10-17 were rejected under 35 U.S.C. § 103 as obvious in view of Hara and Ochi in combination with previously cited WO 93/12877 to Unger et al. and U.S. Patent No. 5,972,427 to Muhlfeld et al.

In contrast to the invention defined by the present claims, Unger et al. do not teach or suggest an adsorbent formed by changing a mixed solution of active carbon and a gel-formable substance into a gel, an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment. Accordingly, Unger et al. do not cure the deficiencies of Hara and Ochi noted above.

Muhlfeld et al. disclose an adsorbent filter fabric comprising a textile carrier having adsorbent particles fixed on it by thermoplastic binding. The adsorbent particles can be coated with a binding agent. Activated carbon can be used as the adsorbent.

In contrast to the invention defined by the present claims, Muhlfeld et al. do not teach or suggest an adsorbent formed by changing a mixed aqueous solution of an active carbon and a gel formable substance into a gel. Thus, Muhlfeld et al. do not cure the deficiencies of Hara and Ochi noted above.

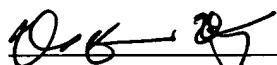
Furthermore, Unger et al. and Muhlfeld et al. do not teach or suggest seasoning either a first or second gel substance, as defined in claim 11. In addition, Unger et al. and Muhlfeld et al. do not teach or suggest an agent for removal of a harmful substance in which the harmful substance is a food additive, a feed additive, an agricultural pesticide, a food poisoning substance, allergen, a heavy metal, or a strongly poisonous organic compound, as defined in claim 14. Also, Unger et al. and Muhlfeld et al. do not disclose or suggest the substances defined in claims 15-17 or adsorption in the digestive system, as defined in claims 18 and 19.

In addition, there is no motivation to one skilled in the art to combine Hara directed to hydrophobic gel, Ochi directed to an adsorbent for an obesity preventative with Unger et al. directed to an adsorbent for fluids in an industrial device or Muhlfeld et al. directed to a fabric for a purification system or clothing. Applicants submit that there must be some suggestion or motivation to combine the references. Furthermore, even if the references were combined the references would not teach the present invention since none of the references teach an adsorbent formed by changing a mixed aqueous solution of an active carbon and a gel-formable substance into a gel and subjecting the gel to a freezing treatment. Moreover, a person of ordinary skill in the art using the teachings of Hara, Ochi, Unger et al. and Muhlfeld et al. would not conceive the construction of the present invention and the peculiar effects of the present invention mentioned above which are accomplished by the construction of the adsorbent.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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